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ON THE APPLICATION OF TRINOMIAL NOMENCLATURE TO ZOOLOGY.*

BY DR. ELLIOT COUES.

I HAVE no formal paper to present on the subject of the Application of Trinomial Nomenclature to Zoology; but speaking off-hand, I wish to offer a few remarks upon a subject at the present time attracting much attention—upon a matter which has come up within the last few years, and which bids fair to effect a very decided change in our system of naming objects in biology. In former years I have not thought it necessary to bring the matter to the notice of the National Academy of Sciences, because it had not then assumed a status or position which appeared to warrant such a course. Now, however, it seems probable that a decided innovation upon a system of nomenclature which has been in vogue for a century and a quarter is likely to be made, at least in one department of zoology. The question is, therefore, whether that innovation is desirable or not—whether the change is to be accepted or rejected; and, if accepted, how far it is likely to be applicable to other departments of zoology, as well as to ornithology.

As is well known to you all, since Linnæus established a binomial system of nomenclature in which each organism should be known by two terms, generic and specific—since 1758, when that system was first consistently and systematically applied to zoology, there has been until the last few years no formal or

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decided change in that Linnæan method; it has become ingrained in the study of biology, and is, in a sense, supposed to be essential to a methodic system of zoology. But it will be remembered that in the long period which has ensued since the time of which I speak, the idea of what constitutes a species in zoology, and, I may add, in botany, has radically and entirely changed. It seems probable, therefore, that a system of nomenclature perfectly adequate and applicable to a former status of zoological thought, may become, in the course of time, inapplicable to the later stage of science. And such appears to be the case. In former years a species was supposed to be a more or less a distinct creation. It was, moreover, supposed to be possible to say of a given organism whether it was or was not specifically distinct from another given organism. At the present day, largely through the influence of the Darwinian Theory of Evolution, which has become established within the last quarter of a century, we know that one animal may not be specifically distinct from another, and yet be sufficiently different to require recognition in some manner, which a system of nomenclature, to be valid and adequate, must provide for. The question is, therefore, how shall we recognize it? That is a subject which has long occupied the attention of zoologists, and they have been working up to the present state of trinomialism by virtue of what may be termed subterfuges. That is to say, a given organism not sufficiently distinct from another to receive a specific name, has been called a "variety," a "subspecies," a "con-species," a "geographical race," or a "climatic variation." Various terms of this sort have gradually crept into the nomenclature of zoology to indicate the still imperfectly differentiated, still incompletely segregated forms, but always with the intervention of some sign or other, as the sign "var.," or with the letters of the alphabet, "a," "b," "c," or with the abbreviation "subsp.," etc., intervening between the binomial name of the creature and the varietal designation which follows; as *Turdus migratorius* for the Robin, *Turdus migratorius* var. *propinquus* for its Western variety, and so on, whatever the given case may be.

This has long seemed to me an entirely unnecessary, superfluous, somewhat awkward and cumbersome method of dealing with the nomenclatural technique of our science, and it has recently come to pass that this needlessly intervening term or

sign has been entirely done away with by the leading ornithologists of this country. The latest lists of our birds discard it altogether, and present a decided and radical innovation upon any binomial nomenclature, by employing the three terms consecutively without the intervention of any sign whatever, as, *Turdus migratorius propinquus*. This method, moveover, as used by competent ornithologists, has a meaning and significance of its own. It is not simply a question of recognizing any variation, any abnormality, any sport, as I may call it, any variety in the old sense of the word; for we proceed upon a perfectly definite, well-understood and recognized principle of variation, viz., variation according to conditions of physical environment, using this term in the largest sense, to cover all those exterior influences which exert a modifying influence upon animal organisms.

From our study of North American birds, which are perhaps better known than the same number of birds of any other portion of the world, we have so exactly traced their geographical variations that we are enabled in some cases to positively foretell what will be the characteristics of a given bird in a given geographical area. In one case at least, within my knowledge, before any specimens were received, a given set of sub-specific characters were hypothetically assigned to a bird (*Junco connecteus* Coues) from a particular region; and, upon receipt of specimens, the hypothetical characters of the presumed sub-species were confirmed.

Here is the definite principle and rule of action in the application of such trinomials. That the third term of the technical name is given to climatic or geographical races varying according to known conditions, as latitude, elevation, temperature, moisture and conditions of all sorts. The practice, therefore, has a logical basis, a consistent possibility of strict scientific application. It appears to me to be a simple, natural and easy way of disposing of a large number of intermediate forms which have not become specifically distinct from their respective nearest allies. It is quite true that the recognition of this result of climatic conditions is largely a matter of tact and judgment, and that it is not always possible to say whether a given organism is or is not "specifically" distinct from another.

There is in this use of trinomials, as you perceive, a principle of practical application entirely different from the more

arbitrary naming of varieties, such as sports and abnormalities. And the question is, what status is this principle likely to obtain in biology? The status that trinomialism has already acquired in ornithology is this: that it is likely in the near future to receive the sanction of the entire body of the American Ornithologists' Union, and is already in use by ornithologists almost without exception in this country. Likewise, in Europe, the trinomial system is beginning to be employed in the very stronghold of British conservatism in the British Ornithologists' Union—one of the leading ornithologists in that country having recently published some monographs of birds, in which that system is applied. Trinomialism is known as the "American school" of ornithology, and the central idea is the "American idea" of ornithology. It is in general use in this country.

Under these circumstances, speaking as one who is largely responsible for the growth and spread of trinomial nomenclature, I have no hesitation in laying the matter before the Academy, for an expression of the views of members present, as to its applicability to other branches of biology, and to inquire whether it seems likely to become a permanent feature of biological science.

In the discussion which followed upon this communication, Dr. Theo. Gill said that the question so well discussed by Dr. Coues was one of terminology, but not only one of terminology. It was well known to all how much these terminological appliances had accelerated and facilitated research. The views expressed were almost a necessary result of profound study of our bird fauna, and the logical application of the doctrine of evolution.

In a time when belief in the creation of animals was practically universal, the name given to any species indicated the condition of things under which an animal was supposed to have come into existence. Had the animals of this country alone been studied, we would ultimately have been led to believe in the doctrine of evolution. No one could take up the study of the birds or other animals of this country without seeing that between certain extremes, the differences are so radical that differentiation into species would be necessary. Such had been the history of ornithology. In early times we knew simply the birds of the Eastern slope. Then we named them as species with limited range of variation. Later, numbers of forms were obtained in

the West, and these forms, although somewhat alike, were also differentiated as species, distinct from those found in the East, and were so named. But still later, large collections were gradually amassed from the intervening regions of the great interior, and these were elaborately studied (in collections sometimes of hundreds), and many were the Eastern and Western so-called species thereby connected. But then it became evident that something more should be done than merely lock together into one heterogeneous fold forms so different. Then it was that this trinomial system came into use as a very convenient tool for the distinction of the various intermediate forms. Ultimately a philosophy became the result of study and practice, so that now we can at once, by the inspection of a catalogue, approximately ascertain whether the forms are radically distinct, what variation exists between the extremes of form, and by the trinomial names, whether a given species is variable and whether it is manifest under a number of modifications.

In this trinomial system we have an example of a scheme by which we can become cognizant of the amount, to a certain extent, of variation in a given group. By this convenient means we are also enabled to differentiate the characters, and to give at once to the mind of the reader or student some idea of the range of characters that may be deemed to prevail in a certain group.

Turning to Dr. Coues's request for information with regard to other groups, Dr. Gill said that it was true that we have in other groups a similar applicability of these principles. A number of examples are afforded in the case of the fishes, insects, and mollusks, where the naturalist is compelled to degrade some forms and admit them as simple variations and sub-species. This scheme would also come in as a convenient tool for the differentiation of recent from fossil forms, there being a number of extinct forms very much like those now existing, which are regarded by some as conspecific and by others as different, receiving different names.

Prof. Wm. H. Brewer remarked that, as a matter of convenience, this was about the only way that we could scientifically describe many varieties of cultivated plants and breeds of domesticated animals, which differ from one another much as species do, the differences, however, being less constant. Already some agricultural writers, who have knowledge of natural history

are beginning to adopt this method in the description of cultivated plants, both useful and ornamental.

Dr. Gill said in regard to this question: "We have had a condition of things which must appeal to the sense of the ludicrous. In former times there was an undivided belief in creation, and yet we had before us our domesticated animals and cultivated vegetables, exhibiting these excessive variations—so great, that if seen in nature, they would be differentiated not only into species, but different genera. Take the dog. We were told the dog was a species—by some said to be created for the use of man. What is the dog? It is not a species in any sense of the word; it is simply a conjugation of forms, derivatives from a number of wild species. The dog is not a species; it is the result under cultivation and domestication of the off-spring of half a dozen different species. It is a composite which itself shows the processes of development in a marked degree, so that we have in what is popularly known as the dog, a combination of species and even genera."

Dr. Coues said it gave him great pleasure to note the extent of the indorsement given to this system; but that he had expected that some one would have put forward the objections which might be raised. As none appeared to be forthcoming, he would venture to state some of them himself. The purpose of the trinomial system, he remarked, is an obvious one, yet that system is so sharp a tool that without great care in handling, one is apt to cut his fingers with it. It is of such pliability and elasticity, and lends itself so readily to little things, that in naming forms one is tempted to push discriminations beyond reasonable and due bounds. It gives one an opportunity—even a temptation—to enter into faunal catalogues and lists of animals an almost indefinite number of very slightly differentiated forms in any department of zoology—forms which perhaps only the eye trained in that special line is able to satisfactorily discriminate. We therefore have in our lists a number of so-called geographic and climatic races which no one but their discoverer or describer is able to recognize or appreciate. This is the real difficulty—the real objection to the system—its abuse in the hands of immature specialists. Dr. Coues said, with some emphasis, that since he had ventured to bring the matter to the attention of the Academy, he would not conclude without adding the word of caution, that

the trinomial system must not be pushed too far; otherwise, almost immediately, our catalogues would be insufferably overburdened with nominal sub-species, too slightly differentiated to require any formal recognition by name.

Note.—In the business meeting of the Academy, which ensued after the public session, Dr. Coues introduced a resolution, which was referred to the Council, that a committee of five be appointed to investigate the subject of zoological nomenclature, with reference to the establishment of a more uniform system.

THREE UNPUBLISHED PAPERS ON ORNITHOLOGY.

By the late Edward Blyth.

No. 2.—Fam. Capitonidæ. The Barbets.

The second group of Zygodactyli without cæca consists of true perching birds which never climb, and have ten tail-feathers only. They are frugivorous, and especially baccivorous, and the American Toucans alone manifest a considerable predatory propensity; while some at least of the *Musophagidæ* subsist partly on insects.* Like the *Picidæ*, they deposit their eggs in the holes of trees, but not of their own forming; and normally produce four (the larger Toucans but two) white eggs, which seems to be the full complement laid by any of the group. The very peculiar African genus *Colius* alone differs in nidificating in dense thorny bushes, where several nests are built together, to the number of five or six. All are peculiar to warm climates, and foreign to Europe and N. America, as also (like the *Picidæ*) to Australia; but a few species occur in the temperate sub-Himalayan region, and others (chiefly Colies) in the Cape colony. With again the exception of the remarkable genus *Colius*, all the species would appear to be essentially (and even exclusively) of arboreal habit. Few are unadorned with bright colours, and these exceptions are comprised in the African genera *Chizhæris* and *Colius* among the

* Vide Dr. A. Smith's account of *Chizhæris concolor* (Zoology of S. Africa). Col. Sykes also states of *Bucco indicus*, "Fruit and insects found in the stomach." Judging from our own experience, however, the Asiatic Barbets would appear to subsist exclusively on fruit; but of a Cape species, we have been assured by Dr. A. Smith, "that it feeds upon insects, and seems partial to ants."

Musophagidæ, and the Malayan genus *Calorhamphus* among the *Bucconidæ*.

The anatomy of all is very similar. Like the Woodpeckers, they have a very low sternal ridge, and the breast-bone is doubly emarginated posteriorly; the coracoids are unusually long; the furcula feeble, and commonly imperfect; its lateral halves (or the two clavicles) not being completely joined in the *Musophagidæ* (at least in *Turacus*), and in the Toucans (*Rhamphastos*) and Barbets (*Bucco*) being more or less short and separated by a considerable interval.* Altogether, the sternal apparatus with its appendages much resembles that of the *Picidæ*, but in the Touracos deviates somewhat from the rest, and is remarkably small in proportion to the general size of the bird. The bill, of enormous dimensions in the larger Toucans among the *Rhamphastidæ*, is moderately large in most of the *Bucconidæ*, and preserves the tendency to inflation in the genus *Musophaga* among the *Musophagidæ*. The tongue, which in the Toucans is long and slender, and barbed laterally like a feather, exhibits a similar structure less developed in the larger Barbets,† and shows a trace of the same conformation in certain Touracos.‡ The gullet is wide and even; the muscular coat of the stomach little developed; the intestine short and wide, about the length of the bird from tip of bill to vent in *Rhamphastos*, $1\frac{1}{2}$ that length in *Bucco*, and about twice in *Turacus*. The *Bucconidæ* and *Rhamphastidæ* have no gall-bladder; and the liver consists of two unequal lobes—the left, on which side the stomach lies, but half covering it, while the right lobe reaches as far as the stomach does; the *Musophagidæ*, on the contrary, have a well developed gall-bladder. Of the three distinct families here indicated, the *Musophagidæ* are wholly peculiar to Africa, and the *Rhamphastidæ* to S. America; the *Bucconidæ* (which are most closely allied to the *Rhamphastidæ* in internal structure) inhabit, in different genera, S. E. Asia, Africa, and S. America. With these alone we have now to deal.

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* M. L'Herminier figures the sternum of *Pteroglossus*, however, with an entire furcula, or probably the clavicles were incompletely joined as in *Turacus*.

† This structure is well shown in *B. asiaticus*, while scarcely a trace of it is observable in the small *B. indicus*. I find that individuals vary in this respect.

‡ Vide P. Z. S. 1834, p. 3, 1830, p. 33.

Fam. Bucconidæ (Barbets).

These derive their common name from the conspicuous tufts of bristles surrounding the beak in most of the species, consisting of a series above each nostril, a tuft at each angle of the gape, and another growing from the chin. In certain of the Asiatic Barbets (as especially *Bucco trimaculatus*) these vibrissæ are much longer than the bill itself, but terminate in fine hair-like extremities; others want them altogether (as *Calorhamphus*); while in the American and some African forms they are little developed, but in typical *Læmodon*—the most characteristic African genus—they are of moderate length, much flattened, and form quite a dense beard under the chin and at the lateral base of the lower mandible, reflected so as to cover half of the under surface of the beak. The bill is usually as long as or longer than the head, robust, conical, more or less compressed, moderately arcuate in some, with one or more strong lateral teeth in certain African genera; in the Asiatic smooth, the tomiæ of the upper mandible overlapping more or less, so as to produce a scissor-like cutting instrument, to a greater or less extent. In these, too, the corneous portion of the upper mandible is continued backward to the gape, and thickened towards the gape. The gape or swallow of all is very wide. Nostrils basal and exposed, forming roundish or oval apertures, placed in a groove at the side of the ridge of the upper mandible.* The feet are truly zygodactyle, and resemble those of the Toucans, being used for perching only, and for hopping from twig to twig; these birds never climbing, like the Woodpeckers. The wings have commonly the first, second, and sometimes third quills short, and the next three or four subequal, being of moderate length; and the flight is sufficiently facile and rapid, though only for short distances from tree to tree.

The Indian Barbets appear to be exclusively baccivorous; and when sated with food they commonly ascend to the higher branches of a tree, and repeat their monotonous call-notes, sometimes two or three answering to each other.

* In the *Rhamphastidæ* the nostrils open backward, high upon the forehead, and posteriorly to the corneous sheath of the bill; while in the *Musophagidæ*, except in the singular genus *Colius*, they are placed remarkably forward.

They are by no means the dull, stupid, gluttonous birds they have been represented, but are as lively and active as most others, though little seen on the wing, while their green colour occasions them to be not much observed among the foliage. When feeding they are silent; but may be observed in numbers on a spreading bar tree (*Ficus indicus*) when the diminutive figs are ripe, together with Coëls (*Eudynamys orientalis*), Hurrials (*Treron*), Orioles, and other kinds of birds which resort to the same diet. In no respect, however, are they gregarious in the least degree.* The size of the *Bucconidæ* varies from that of a Jay down to that of a Sparrow; and that they nestle in holes of trees, as commonly described, we have at least this evidence, that we have seen three unfledged young of *B. asiaticus* taken out of a hole in a mango tree;† but we have not been able to obtain the eggs. In confinement we have kept them (*Bucco asiaticus* and *B. indicus*) long on plaintains, but they much prefer berries which they can swallow entire, and smear the plumage of the head much when obliged to feed on plaintains; nevertheless they continued in health, and would often utter their loud notes. They never descended to the ground except to drink, or when food was lying there and none elsewhere. The sexes of all appear to be similar.

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* Of one or more Cape species, Dr. A. Smith informed us:—"Flight straight; the wings moved rather rapidly and to a considerable extent. Some of them whistle when perched, and utter a hoarse scream when surprised. Generally several individuals are found in the same locality, but not associated; when disturbed they never fly together, but each takes a different course." This is pretty much as in the Asiatic species.

† We are therefore satisfied that Capt. Tickell described the nest and eggs of some other bird as those of *B. asiaticus*, in J. A. S. xvii. 298. Dr. A. Smith, in his obliging communication (1837), remarks of the Cape species before referred to, "They nestle in holes of decayed trees and ascend (?) to them; but I have never seen them feeding in holes." Does he mean that they run up the trunk? The word ascend is not legible with certainty in his MS.; but in Mr. Swainson's 'Classification of Birds,' ii. 136, we read that "Mr. Burchell was the first naturalist who discovered the affinity" (N.B. Similarity of habit does not, of necessity, imply affinity) "of these birds to the Woodpeckers, having repeatedly heard their loud tapping in the forests of S. Africa, and witnessed their dexterity in climbing trees." We doubt that the Asiatic Barbets either climb or tap. Mr. Jerdon remarks of *B. asiaticus*, "This bird does not climb like a Woodpecker, and I never heard any tapping from the trees it frequents;" and of *B. indicus*, "Though I never detected this Barbet tapping like the Woodpeckers, I have once or twice had good reason for supposing that it does so occasionally." *Query.*

Genus Bucco, L.*

Bill large, conical, wide at base, more or less compressed for about the terminal half, the tomiæ smooth, and base of the upper mandible continued backward to the gape; culmen obtusely rounded; and the tips of both mandibles generally of equal length, the vibrissæ surrounding the bill well developed. These birds are peculiar to S. E. Asia and its islands, where very numerous species exist, from the size of a Jay downward, all of which are bright green, varied chiefly about the head and neck with every brilliant colour, though a few have these parts dull whitish, more or less lineated with dusky. Their other characters have been already stated.

B. GRANDIS, Gmelin; Gould's 'Century,' pl. 46.—Length about 1 ft.; of wing $5\frac{1}{2}$ in., and tail 4 in.; bill to forehead $1\frac{3}{4}$ in., or nearly so. Colour of the back, scapularies, secondary wing-coverts, and breast, brown; head and neck dusky indigo-blue, divided from the brown of the back by a narrow yellowish white half-collar; hinder half of the wings, rump, and tail, green; the primaries and their coverts bluish externally; and the lower tail-coverts crimson; flanks brown, the feathers margined laterally with yellowish white, imparting a streaked appearance; the middle of the belly dull bluish. Bill yellowish white, with dusky tip, in the dry specimen. Young very similar, but the colours less defined apart, and the nuchal half-collar and lateral margins of the feathers of the flanks are more of a golden hue; the size also is smaller, the bill less developed, and the feathers are of more open texture (as usual in young birds). The name was founded on Buffon's description of *le Grand Barbu* (Ois. vii. 106), which, though received from China, appears to be identical with the common Himalayan bird described above; although the play of colours on the head and back which he notices is not very perceptible. Eastward, we have seen it from Cherra Punji (N. of Sylhet), but not hitherto from Assam, though doubtless inhabiting the mountain ranges of that province; and it does not appear to

* Mr. G. R. Gray has changed this name to *Megalaima*, reserving the name *Bucco* for a genus of *Tamatiidæ*, a species of which he considers to be the first or typical *Bucco* of Linnæus; but the name is so well established for the present group, that we consider the alteration unadvisable. Indeed, the name *Bucco* would seem rather to indicate the Asiatic Barbets.

exist in those of Arracan and thence southward. Capt. Hutton, writing from Masuri, informs us that—"It is found both in the Doon and in the hills; it is common here all the year through, but very numerous in winter. They feed," he adds, "on fruits and berries, and will sit for hours together on some tall tree, uttering a monotonous *hoo-hoohoo* without intermission. In flying they make great exertions, as if they were fearful of falling to the ground." The American Toucans are said to fly with much exertion; but we have not remarked this of the species of *Bucco* which have fallen under our observation.

B. LINEATUS, Vieillot (apud Dict. Class.); *B. corvinus*, Temminck, p. c. 522 (apud Horsfield, P. Z. S. 1839, p. 165). *Pho-goung*, Arracan.—Length about 10½ in.;* of wing about 5 in.; and tail 3½ in.; bill to forehead 1¼ in. Colour vivid green above; the head, neck, and under parts whitish, with brown lateral borders to the feathers more or less developed on different parts; on the crown the brown predominates towards the forehead, becoming more distinctly lineated with whitish on the occiput and nape, these whitish streaks continuing more or less on the green of the back; throat streakless, whitish, and the feathers of the lower parts but narrowly margined laterally with brown; belly, flanks, and lower tail-coverts green, the tail more tinged with yellow, and the green more or less extended forward in different specimens. Bill reddish-white (in preserved skins), and the legs pale. This bird is exceedingly common in Nepal, Assam, Sylhet, Tipperah, Arracan, and the Tenasserim Provinces; and is reported by M. Vieillot from Sumatra, though it was not met with in that island by Sir Stamford Raffles. Of many dozens of skins examined, we have seen none that could be confounded with the next species; and make no doubt that this, rather than *B. caniceps*, was the bird we formerly received from Mymunseng in Upper Bengal, where likewise it is abundant.

B. CANICEPS, Franklin, P. Z. S. 1831, p. 121; *B. lineatus*, apud Tickell, J. A. S. ii. 579; *P. zeylanicus* (?), Linn.†—Size and pro-

* Capt. Hutton gives 11½ in. as the total length of a Doon specimen, we presume when recent.

† *Bura Bussunta* of India, apud Franklin, which simply means 'Great Barbet.' Col. Sykes remarks—"Scarcely distinguishable from *Bucco corvinus* and *B. javanicus*." It is undoubtedly allied to the former; but if the latter mean *B. javansis*, Horsfield (v. *katoreas*, Tem.), the close affinity, according to the description of *B. javansis*, is not apparent.

portions of the last, or a trifle smaller. Length of a fine recent specimen 10½ in., by 16 in. in expanse; wing 4¾ in.; tail 3½ in. Colour of bill reddish; the iris brown; feet light yellowish brown; bare skin around the eye dull orange. General colour of *B. lineatus*, but the brown much predominating over the whitish on the head, neck, and under parts; the throat, more especially, being always dusky-brown instead of whitish; the pale streaks to the feathers of those parts are much more reduced and narrow than in *B. lineatus;* and they are commonly more continued, though gradually diminishing, upon the green of the back; while each wing-covert and tertiary (in the unworn plumage) has a whitish speck at tip, which is never seen in *B. lineatus;* the fore neck and breast are almost uniform brown, instead of whitish, lineated with narrow brown lateral streaks to each feather. Such is the common species of Central India, found northward in the Deyra Doon, where it occurs together with *B. lineatus*. In Lower Bengal, properly so called, it is not met with; but immediately to the westward of the alluvial soil of the Ganges, it abounds (as in the Mednapur jungles). Its voice is a loud rolling or thrilling note, continued for some time, when it breaks into the abrupt *kuruwúk, kuruwúk, kuruwúk*, also repeated for a long while together, of *B. asiaticus*, the note of which species differs only in not being preceded by the introductory roll. Specimens from Ceylon are invariably smaller, having the wing commonly 4¼ in., and the throat and under parts are generally of a darker colour. A Nilgiri specimen, the only one we have seen from S. India, is of intermediate size, the wing measuring 4½ in.; the brown of the nape passes on to the back and even the scapularies; and there do not appear to have been any pale specks tipping the wing-coverts; but the skin is not in good order, and its feathers are old and worn.* Whether the Ceylon bird here noticed is really that figured and described in Brown's 'Zoology,' as the 'Yellow-cheeked Barbet,' remains to be ascertained. M. Drapiez, describing, we presume, from Levaillant's figure (Ois. Par., pl. 38, gives 7 in. 3 l. (French) as the length, with beak and naked skin surrounding the eyes red, from Ceylon. This is both too small for the bird before us, the length of which is about 9½ in.

* Of those of the Dukhun, Col. Sykes gives the total length as 8 7-10ths in., inclusive of tail of 2 7-10ths in. "The bird," he remarks, "is consequently smaller than Major Franklin's, who gives 10 in. as the length."

(English), and too large for Brown's description, where the figure is stated to be somewhat more than two-thirds of the size of the living bird, which accordingly should be under 6 in. in length, or still smaller than the next species. The colouring (as described, not as figured) agrees sufficiently with that of *B. caniceps*, even to the whitish specks tipping the wing-coverts.

Mr. Jerdon, in his original catalogue, confounding this species with the next, describes it as "found throughout" (the peninsula of) "India, only in the higher jungles, being therefore of course most abundant on the west coast, where it is found from the level of the sea to the top of the Nilgiris, where it is more abundant than in any other locality I have visited. There is a very remarkable variation in the size of this species, the largest specimens" (*B. caniceps*) "being found on the Nilgiris, and degenerating in size" (*i.e.*, *B. viridis* making its appearance) "as you approach the coast. From Mr. Elliot's notes," he continues, "I extract the following interesting observations:—'Seldom seen on the wing, but single birds heard on almost every tree, uttering their peculiar note, which resembles the native (Canarese) name, being a continued *kóoturr*, *kôturr*, or *k'turr*. They continue to call for some minutes at a time, and are heard throughout the day. On each side of the throat is a naked spot with skin wrinkled, which is probably contracted and expanded when the bird is calling.' One was shot picking at the flowers of a small tree." The length of wing of the large specimens Mr. Jerdon gives as $4\frac{1}{2}$ in. only; and, as native names, he mentions *Kootoomra*, Hind., of some shikaris, *Kootoorga*, Mahr., and *Kootur Kakee*, Can.,—all derived from the call.*

More recently, in distinguishing the two species, Mr. Jerdon writes, "This large *Bucco* is found in all the jungles of" (peninsular) "India, as well on the east as on the west coast. I have specimens from Malabar, and the eastern ghâts, and have seen others from Goomsoor, and Bengal" (Mednapur district).† The wing he here describes as 5 in. long, perhaps from a northern specimen. It measures so much in a Deyra Doon example before us, but rarely (we suspect) exceeds $4\frac{3}{4}$ in.; while in the Ceylon bird (as we have said) it is generally but $4\frac{1}{4}$ in. Capt. Hutton gives 11 in. as the total length of a Doon specimen; and of this

* Madr. Journ. xi. 217. † Ibid. xii. 140.

and the preceding species he remarks, "The iris is white. Neither of them inhabits the hills."

B. VIRIDIS, Linn.—Again similar, but much smaller, not exceeding $7\frac{1}{2}$ or $7\frac{3}{4}$ in. long, the wing 4 in., and tail $2\frac{3}{4}$ in.; bill to forehead $\frac{7}{8}$ in. Colour similar, but the brown of the head and nape scarcely lineated; that of the under parts pale, becoming whitish on the throat. There are no pale specks on the wing-coverts, nor traces of pale streaks on the green of the back. "The true *B. viridis*," remarks Mr. Jerdon, "as I find on reference to the figure in Temminck's pl. col. pl. 870, is the bird found on the Nilgiris, and occasionally in other parts of the Malabar coast." It is peculiar to the Indian peninsula.

B. CHRYSOPOGON, Tem. (p. c. 285).—Length 11 in. and upwards; the wing 5 in., and tail $3\frac{1}{4}$ in.; bill to forehead 2 in. Colour green, more yellowish beneath, and the nuchal and dorsal feathers margined with brighter green; forehead, supercilia, ear-coverts, and throat, greyish-brown; a large vivid yellow moustache; feathers immediately above the nostrils crimson; crown and occiput dusky, with crimson tips to the feathers, margined with bright blue; the crimson predominating in the middle, and the blue on the sides of the occiput; a slight blue gorget, margining the greyish-brown of the throat; tail bluish underneath (as usual in the genus); the terminal half of the primaries edged with pale buff. Bill black, and the feet appear to have been plumbeous. Young similar, with feathers of much looser texture, and the colours, excepting the green, much less brilliant. Inhabits the Malayan peninsula and Sumatra.

B. VERSICOLOR, Raffles (Tem. p. c. 309). *Takoor*, Mal.; *Takoo*, Sumatran (generic).—Length about 10 in.; the wing $4\frac{1}{2}$ to $4\frac{3}{4}$ in.; and tail 3 in.; bill to forehead $1\frac{1}{2}$ in. Colour green, more yellowish beneath, the nuchal and dorsal feathers margined with brighter green; forehead, crown, and occiput, crimson; also a spot below the eye, and another on each side of the base of the fore-neck; supercilia, chin and throat, and base of the moustache, brilliant blue; the remaining larger portion of the moustache bright orange-yellow; the lores and ear-coverts black; beak black, the vibrissæ reaching beyond its tip. Young similar, but with the colours much less bright, and the forehead greenish. Inhabits the Malayan peninsula and Sumatra, being particularly abundant.

B. QUADRICOLOR, Eyton, P. Z. S. 1839, p. 105.—Length about 8½ in.; of wing 3¾ to 4 in.; and tail 2¼ in.; bill to forehead 1⅜ in. Colour green, yellower beneath, the nuchal and dorsal feathers margined with brighter green; forehead bright orange-yellow, and a tinge of this colour at the base of the moustaches; crown, chin and throat, and a spot on each side of the base of the fore-neck, also another at the base of each nostril, crimson; a spot below the eye, and gorget margining the crimson throat, verditer-blue; terminal portion of the primaries margined with pale buff; the bill black. Inhabits the Malayan peninsula.

B. ARMILLARIS, Temminck (p. c. 89, f. 1).—Length about 7¼ in.; the wing 3¾ in.; and tail 2½ in.; bill to forehead 1 in. Colour green, yellower below; the forehead and supercilia bright orange-yellow; crown, chin and throat, verditer-blue; a spot on each side of the base of the fore-neck, and a half-collar on the nape, crimson. Bill and loral feathers black. The young, as described by Stephens, have all the plumage green or greenish, shaded with bluish, and marked on the tip of the feathers of the upper parts with bright green lunules; the yellow on the head and collar expands as the individual advances in age."* Inhabits the Malayan peninsula, and Java (?). Specimens of this and of the three preceding species, also of *B. trimaculatus*, are common in the Malacca collections; those of *B. versicolor* and *B. trimaculatus*, however, being much more numerous.

B. ASIATICUS; *Trogon asiaticus*, Shaw; *Capito cyanocollis*, Vieillot; *B. cyanops*, Cuv.; *B. cæruleus*, Dumeril. *Burra Bussunt-bairi*, Bengal; *Koop-kha-loung*, Arracan.—Length about 9½ in., by 13½ in. in expanse; wing 4 to 4¼ in.; tail 3 in.; bill to forehead 1 in. Colour green above, with a slight ruddy tinge on the back; yellower below; forehead, occiput, and a spot on either side of the base of the fore-neck, crimson; band across the crown, continued backward as an upper supercilium, black; cheeks, ear-coverts, moustache, throat and front of the neck, including a narrow lower supercilium, verditer-blue. Bill black above, the sides of the basal half (and often the whole base) of the upper mandible, and the lower mandible except at tip, pale

* Stephens, probably describing from Temminck's plate cited above, mentions a golden-yellow half-collar on the breast, which we have never seen among numerous Malacca specimens examined. He gives Java as the habitat; and erroneously refers to this species the *B. flavifrons*, Cuv.

greenish yellow. Irides reddish hazel; nude orbital skin tinged with orange; the lids with a circlet of orange wart-like papillæ, forming the orbits; legs greenish ashy. Young similar, but the colours of the head and neck less vivid, the red being mixed with green, and the dusky transverse coronal band with blue. Exceedingly common in Lower Bengal, and northward to the sub-Himalayan region; likewise abundant in Assam, Sylhet, Tipperah; becoming rare in Arracan. Capt. Hutton notices this species and *B. indicus* as being common in the Deyra Doon, neither of them occurring ever in the hills. Its voice has been mentioned under the notice of *B. caniceps*.

B. FRANKLINII, Blyth, J. A. S. xi. 167.—Length about 8 in.; of wing $3\frac{3}{4}$ to 4 in.; and tail $2\frac{1}{2}$ in.; bill to forehead $\frac{7}{8}$ to 1 inch. Colour green, much yellower below; the shoulders of the wings, and margins of the primaries, blue; forehead and occiput crimson; the crown and throat orange-yellow, often tinged with crimson on the crown and at the corners of the gape, lores and sincipita black; ear-coverts, and continued round in a half circle below the orange throat, a sort of whity-brown. Bill black. Young similar, but the colours of the head and throat are less brilliant. Common in the S.E. Himalaya, as in Nepal and Sikim; also at Cherra Punji, and doubtless therefore inhabiting the mountain ranges of Assam.

B. INDICUS, L.; *B. philippensis*, Gm.; *B. flavicollis*, Vieillot; *B. rubricollis*, Cuv.; *B. luteus*, Lesson, albino variety (Jerdon). *Chota Bussunt-bairi*, Beng.; *Kut-Khora*, H., also *Tambayut*, *i.e.* 'Coppersmith,' which name it receives also from some European residents (Jerdon); *Chanda*, Sumatra; *Engku*, Java.—Length $6\frac{5}{8}$ in., by 11 in.; wing 3 to $3\frac{1}{4}$ in.; tail $1\frac{1}{2}$ in.; bill to forehead $\frac{3}{4}$ in. Colour green above, with a slight ruddy tinge, the feathers more or less margined with yellowish; below yellowish white, streaked with green; the whitish predominating on the middle of the belly; broad frontal space, and a wide gorget, crimson; throat, and above and below the eye, sulphur-yellow; below the crimson gorget is a narrow crescent of golden-yellow; band across the crown, continued round to the yellow throat, and including the moustaches, black; a bluish tinge on the occiput and sides of the neck, and on the margins of the great alars and tail. Bill black. Irides dark hazel; nude orbital skin dull crimson. Feet pale crimson, or coral-red, with contrasting black

claws. Young much duller in colour, with no trace of crimson or black on the plumage, but yellow above and below the eye and on the throat. This small Barbet is the commonest of the Indian species, and appears to have a more extensive distribution than any other of the genus. We have seen it from Tipperah, Chittagong, from Ramree (Arracan), and it abounds in the Tenasserim provinces, occurring likewise in the Malayan peninsula, about the latitude of Penang, but we have not seen it from Malacca. It inhabits Sumatra and Java, and the description of *B. philippensis*, from the Phillippine Islands, accords, except that the black band on the crown and sides of the neck is not mentioned. We have not remarked it from Assam; nor in Himalayan collections. In Lower Bengal it is extremely common, and appears to be equally so in the Indian peninsula. Mr. Jerdon writes of it:—"The Copper-smith is extremely common in all parts of the country, wherever there is a sufficiency of trees, inhabiting open spaces in the jungles (never in the denser portions), groves, avenues, and gardens; being very familiar, approaching close to houses and sometimes perching on the house-top. When not employed in feeding, it generally perches itself on the very top of a tree, and gives utterance to its monotonous call of 'took, took, took' (as represented by Sykes), nodding its head at each call, first to one side and then to the other." Such are its habits, as familiarly observed in Bengal: but its sonorous and repeated "hugh" is often uttered as it hops from twig to twig, regardless of observation, its throat puffing out at each repetition of the sound.

B. MALABARICUS, nobis, J. A. S. xvi. 465; described and erroneously referred to *B. barbiculus*, Cuv., *ibid.* xv. 13.—"Length 5 in." (probably more in the recent specimen); "of wing $3\frac{1}{8}$ in., and tail $1\frac{3}{8}$ in.; bill to forehead $\frac{5}{8}$ in. General colour deep green; the forehead, around the eyes, and the throat, crimson, the last margined with yellow; occiput and cheeks pale blue." From the Malabar jungles.

B. RUBRICAPILLUS, Gmelin, founded on pl. xiv. of Brown's 'Zoology.'—Length about 6 in; of wing 3 in., and tail $1\frac{1}{2}$ in.; bill to forehead $\frac{3}{4}$ in. Colour green above, much paler, with a slight bluish tinge below, and a more conspicuous tinge of blue on the sides of the neck; broad frontal space, and also a slight gorget, crimson; throat, and above and below the eye, deep

orange-yellow; and a crescent of the same below the little more than indicated crimson gorget. The under parts of this and of the last species are streakless. Common in Ceylon, where it appears to replace *B. indicus*. Though Brown's figure, from which the descriptions of this bird have been taken, is very faulty, and the said descriptions of it are therefore erroneous, it is clear upon comparison of that figure with specimens that the Cinghalese species here described was intended to be represented.

B. FLAVIFRONS, Cuv. (Levaillant, Ois. Par. pl. 55).—"Length 6 in. (French).—Upper parts green, with the edges of the feathers yellowish; lower parts pale green; breast scale-like (*maillée*); forehead of a beautiful golden yellow; a spot of this colour at the base of the beak; around the eye, and the chin, blue, as are also the tail-feathers underneath." Inhabits Ceylon, and is stated to be nearly allied to *B. australis*, Horsfield (v. *gularis*, Temminck). *Non vidi.*

B. TRIMACULATUS, Gray; *B. australis* apud Raffles (nec Horsfield); *B. cyanotis*, Blyth, J. A. S. xvi. 465 (Arracan variety). *Toupak*, Malacca; *Uget-pa-din*, Arracan.—Length about $6\frac{1}{4}$ in., of wing 3 in. to $3\frac{1}{8}$ in., and tail $2\frac{5}{8}$ to $2\frac{3}{4}$ in.; bill to forehead $\frac{3}{4}$ in.; the rictal bristles reaching $\frac{1}{2}$ in. beyond its tip. Colour deep green above, more yellowish below, tinged with blue on the tail and edges of the wings; throat bright light verditer; the sides of the forehead, and posterior half of the crown, verditer blue-grey; anterior half of the crown, ear-coverts, feathers at base of lower mandible, and slight gorget (more or less defined), black; three large crimson spots on the sides of the face, one behind the eye and above the ear-coverts, a second below the lores and in front of the ear-coverts, and a third below the ear-coverts. Bill black. Young wholly green, paler below, with merely a bluish tinge on the throat; the base of the lower mandible white in dry specimens. Extremely common in the Malayan peninsula, and in Sumatra; from the Tenasserim provinces we have not seen it; but in Arracan it is abundantly represented by a race (*B. cyanotis*, Bl.), having the crimson spots much weaker, and the ear-coverts and feathers anterior to the sincipital crimson spot (which are black in the Malayan race) of the same verditer hue as the throat. We have seen but one Malacca specimen in which the ear-coverts were not black; and in this they were green, with but a slight admixture of

verditer, while the crimson spots were as deep-coloured as usual.

Genus CALORHAMPHUS, Lesson.

Differs from *Bucco* in having no vivid colours, nor vibrissæ surrounding the bill; the upper mandible of which is somewhat acutely carinated above, having the ridge continued backward to the forehead, and of an arcuated form, its extremity curving over that of the lower mandible; sides of the bill smooth and flat, continued backward to the angles of the gape. Wings having the third, fourth, and fifth primaries subequal, the second shorter, and the first but half the length of the third. Rest as in *Bucco* (so far at least as external characters are concerned). But one species is known.

C. LATHAMI; *Bucco Lathami*, Gmelin; *C. sanguinolentus*, Lesson; *Micropogon fuliginosus*, Temminck; *Megalorhynchus spinosus*, Eyton. *Unkat Besea*, Penang; *Ampis*, Sumatra. Length about 7 in., of wing $3\frac{3}{8}$ in., and tail 2 in.; bill to forehead 1 in.—Colour deep brown above, with slight greenish margins to the feathers of the back and the upper tail-coverts; stems of the coronal feathers thickened and prolonged into soft spines; below somewhat glistening yellowish white, passing to ruddy-brown on the throat. Bill blackish in the presumed males, carneous in the presumed females; legs coral-red. Young similar, but with a smaller bill, and the greenish edges to the feathers more developed and showing on the under parts. Common in the Malayan peninsula and in Sumatra. We know nothing of its habits.

Note.—Besides the six species of *Bucco* here noticed as inhabiting the Malayan peninsula, there are several others in the neighbouring islands of Sumatra and Java, certain of which may yet be discovered in the peninsula, especially in the more elevated forests of the interior. Such are *B. javensis*, Horsf. (v. *kotoreas*, Tem.); *B. mystacophanes*, Tem.; *B. fuscicapillus*, Drapiez; *B. tristis*, Drapiez; *B. Rafflesii*, Lesson; *B. oorti*, Tem.; *B. roseus*, Cuv. (v. *roseicollis*, Horsf.); *B. australis*, Horsf. (v. *gularis*, Tem.), and probably others with whose names we are unacquainted, if some of those mentioned be not *doubles emplois*. In the Tenasserim Provinces, Dr. Helfer states the existence of five species,*

* J. A. S. vii. 862.

of which we have seen two only, *B. lineatus* and *B. indicus*, both of which are common. In Arracan, the latter seems to be confined to the vicinity of the coast; but the former abounds, also the *cyanotis* variety of *B. trimaculatus*, and *B. asiaticus* first makes its appearance in that direction. *B. lineatus* continues abundant in Sylhet, Assam, Nepal, and, we believe, Upper Bengal; this and *B. asiaticus* being the only Barbets we have hitherto seen from Assam. In the Himalaya, *B. grandis* and *B. Franklinii* are true hill species, both of which occur at Cherra Punji N. of Sylhet, whence there can be little doubt of their also inhabiting the hill ranges of Assam. In Nepal the assemblage consists of *B. grandis*, *lineatus*, *asiaticus*, and *Franklinii*, with probably *indicus* accompanying *asiaticus* in the valley and parts of the Terai region. In the delta of the Ganges we have only *asiaticus* and *indicus*; but immediately to the westward *caniceps* replaces *asiaticus*, as it does *lineatus* more to the north; and this last species inhabits the whole peninsula of India, being represented by a rather smaller race in Ceylon, and perhaps another in the Nilgiris. A still smaller race, but otherwise nearly similar, the *B. viridis*, is peculiar to S. and W. (?) India; while *B. caniceps* inhabits so high as the Deyra Doon; and perhaps the true *B. zeylanicus* will be found to constitute another allied species in Ceylon. In that island we find that *B. indicus* (so generally spread over India) is replaced by *B. rubricapillus*; and in the Malabar jungles there is *B. malabaricus*, which chiefly (or only?) differs from *B. rubricapillus* in having the throat and above and below the eyes crimson like the forehead, instead of orange-yellow. Another small species, the *B. flavifrons* assigned to Ceylon, which we have not seen, completes the series as at present known; and we have information of a handsomely coloured Barbet in the interior of Ceylon (which is perhaps the *flavifrons*, additional to *B. caniceps*, var., and *B. rubricapillus*. That island contains therefore at least three species of the genus; and perhaps a fourth in *B. zeylanicus*, unless this name be ascertained to refer of necessity to *B. caniceps*, var.; and excepting the latter it will be remarked that the Ceylon species differ decidedly from those of the mainland of India. Of the Barbets of the N.W. provinces, we have no satisfactory information; but expect no additional species in that direction, where the genus attains the N.W. limits of its geographical range.

PS.—We have been assured, on good authority, that *B. asiaticus* has been seen to climb, in the manner of a Woodpecker, to its nest-hole; and this is probably the amount of its scansorial propensity.

Note.—Since the accompanying sketch of the Indian Barbets was printed off, Capt. Tickell has obligingly favoured us with a transcription of Mr. G. R. Gray's article on the group, published in his 'Illustrated Genera of Birds.' He includes it (like most of his predecessors) among the *Picidæ*, as a distinct subfamily; whereas it has a much better claim to be thus included as a subordinate division of *Rhamphastidæ*; and of his genus *Megalaima* (our *Bucco*), he enumerates twenty-nine species, to which *B. malabaricus* has to be added. We may subtract, however, his *M. lutea*, referred by Mr. Jerdon to *B. indicus* as an albino variety; and *M. maculata* (*Trogon maculatus*, Gm.), founded on Brown's figure of "the Spotted Curucui," which is decidedly intended to represent a variety of our *Chrysococcys smaragdinus* (J. A. S. xv. 53). *B. Lathami*, Gm., is likewise included, and with propriety; while our *Caloramphus Lathami* he gives as *Megalorhynchus Hayii* (Gray), with the synonyms we have cited excepting *Bucco Lathami*. There are also certain African species included, which we hesitate to adopt as members of this generic division. The following reductions and rectifications of synonyms of species described or referred to in the accompanying paper may be accepted on his authority.

B. VIRENS, Boddaërt; *B. grandis*, Gmelin.

B. VERSICOLOR, Raffles; *B. Rafflesii*, Lesson. (There can be little doubt of this identification, though the forehead of *B. Rafflesii* is said to be black, meaning probably the extreme base only of the forehead).

B. PHILIPPENSIS, Brisson; *B. flavigula*, Boddaërt; *B. indicus*, Latham, &c.

B. FLAVIFRONS, Cuv.; *B. aurifrons*, Temminck.

B. TRIMACULATUS, Gray; *B. frontalis*, Tem.; *B. Duvaucelii*, Lesson.

B. OORTI, Muller; *B. Henrici*, Temminck.

B. ROSEUS, Cuv.; *Capito rosaceicollis*, Vieillot; *B. barbiculus*, Cuv.; *B. roseicollis*, Vigors.

And a B. MALACCENSIS, Hartlaub (Rev. Zool., &c., 1842, p.

337), is given, which has probably to be added to the species inhabiting the Malayan peninsula; while *B. fuscicapillus* and *B. tristis*, Drapiez (Dict. Class. d'Hist. Nat.), are omitted. Mr. Gray brings all the toothed species of Africa under his genus *Læmodon* (*Pogonias*, Illiger), even such as *L. leucomelas* (Boddaërt, v. *B. niger*, Gmelin, *Pogonias Stephensii*, Leach, and *B. rubrifrons*, Stephens), which has the beak comparatively small and the vibrissæ but slight, although among the generic characters of *Læmodon* he states—"the base of both mandibles furnished with long bristles." Other African species are referred by him to the American genus *Capito*, Vieillot. Altogether he gives ten species of *Læmodon*, twenty-nine of *Megalæma* (*Bucco*), fifteen of *Capito*, and one respectively of *Psilopogon* and *Megalorhynchus*, making a total of fifty-six as the approximate estimate of the number of species of *Bucconidæ* at present known.

Of the habits of *Læmodon*, Mr. Gray writes:—"These species inhabit the forests of Africa, where they are usually observed in pairs, living on insects and fruits. They select a hole of a rotten tree, in which the female deposits her eggs on the bare wood. On quitting the nest the young form a small band with the parents, and all live together in perfect harmony until they in their turn separate into couples. These birds are so devoid of fear that it is easy to find their nest, it being only necessary to follow the little band towards the evening to the hole where they reside, and to which they always retire to pass the night." This is quoted to invite a closer observation of the habits of the Indian species, which, though not gregarious, very probably retire to their holes to roost. Mr. Gray adds, "They sometimes take possession of one of the cells of the large" (compound) "nests of certain Weaver-birds," in a compartment of which M. Levaillant states that he once found an aged Barbet in a helpless condition, which must long have received its food from others.

Further, Mr. Gray remarks, of the species of *Megalaima* (our *Bucco*):—"They have been observed climbing round and picking holes in a horizontal rotten branch, precisely in the manner of the Woodpeckers, though they do not employ their tail for support while thus occupied. In the interior of the hole is built their nest" (or are the eggs laid on the bare fragments of rotten wood?). Attention is invited to these particulars.

According to Capt. Tickell, *B. virens* (v. *grandis*) "swarms at

Darjiling, and its monotonous *péó-péó-péó*—from morning to night is heard until the rains are over (early in October), and the young birds are seen wandering about on the roadside. A Bengalee name for *B. asiaticus* is *Suttára*, imitative of its loud note."

For "the *Rhamphastidæ*," in note [p. 249], read "*Rhamphastos*." In the allied genus *Pteroglossus* the nostrils are placed more as in the Barbets, but not in a groove; except in the subgroup *Aulacorhynchus*, wherein this groove extends very far along the upper mandible.

Just as the above was going to press, we have been fortunate in procuring a living specimen of *Bucco philippensis*, caged and sufficiently reconciled to confinement, which has afforded the means of the following observations:—

1. Having tied together a few of the primaries of each wing to prevent its flying, the bird was placed on the trunk of a tree, and at its base where the principal root-branches begin to spread; but it manifested no disposition whatever to climb or ascend (as a Wryneck does under similar circumstances). On the ground it hops with facility enough, though not with the easy successive hops of a Sparrow, being essentially a percher.

2. When it was tolerably hungry, we tried it with various kinds of insects, but the first which attracted its attention were some small soft maggots, some of which it picked up and scattered, but did not swallow one. Afterwards it seized some grasshoppers and large spiders, which it held and squeezed or munched for an inordinately long time within the particularly firm grip of its mandibles, and then rejected, taking up another which it had perhaps thus squeezed and mashed before. Mr. Broderip's Toucan, it will be remembered, treated an unfortunate Goldfinch in the same manner; but at sight of fruit, the Barbet at once left his insect victims, none of which he swallowed, though certainly in want of food when these were supplied him.

ON THE ORIGIN OF THE EDIBLE FROG IN ENGLAND.

By G. A. Boulenger.

We need go no farther back than 1844 for the first certain record of the occurrence of this frog in England. Mr. F. Bond, in 'The Zoologist' for 1844 (p. 293), mentions the discovery of *Rana esculenta* by Mr. C. Thurnall, of Duxford, in Foulmire Fen, Cambridgeshire, in September, 1843. At the meeting of July 9th, 1844, Yarrell exhibited specimens on behalf of Mr. Bond, which were presented to the British Museum; others were presented by Mr. Bond to the Zoological Society, subsequently transferred to the British Museum; others again were deposited at the same time in the Museum of the University of Cambridge. It is fortunate that several specimens of the Edible Frog as originally discovered in Foulmire should have been preserved, for a few years later the fen was drained, and these frogs appear to have entirely disappeared from Cambridgeshire.

Although, as just stated, the first *certain* reference to the Edible Frog in England is dated 1844, two old authors give the animal as British—Pennant ('British Zoology,' iii. p. 13, 1776), without reference to any locality, and Shaw ('General Zoology,' iii. p. 103, 1802) as "rare in England." And Pennant has a note on the Common Frog (p. 11), which, it would seem, applies only to the Edible Frog:—"The croaking of frogs is well known, and from that in fenny countries they are distinguished by ludicrous titles; thus they are styled 'Dutch Nightingales' and 'Boston Waits.'"

It is also important to learn from Bell, in the second edition of his 'British Reptiles,' and in a letter published in 'The Zoologist' for 1859 (p. 6565), that his father, who was a native of Cambridgeshire, had described to him, as long as he could recollect, the peculiarly loud and somewhat musical sound uttered by the frogs of Whaddon and Foulmire, which procured for them the name of "Whaddon Organs." These references, however, to voice only appear to me to be quite insufficient to prove the ancient existence of the Edible Frog in England, for it must be borne in mind that the Natterjack Toad, *Bufo calamita*, which no doubt inhabited the same fens, produces a very loud croak from the holes and fissures in the clay in which it remains concealed

in the daytime, and may equally have merited the appellation of "Dutch Nightingale," or "Whaddon Organ."

Returning to the subject, we next have in 'The Zoologist' for 1844 a tolerably good figure (p. 467), an additional note by Mr. F. Bond (p. 677), in which he states that the frog is very abundant in Foulmire Fen, and a note by Bell (p. 727) giving some of the characters distinguishing the new frog from the common species.

In 1847 (Zool. p. 1821) we have a communication by J. Wolley, questioning whether the Edible Frog is a true native of Britain, and learn that Foulmire Fen is drained, and the frogs have dispersed (or become extinct). Remarking on the occurrence at the same place of the Edible Snail, *Helix pomatia*, he adds:—"They are, if I mistake not, believed by conchologists to have been originally introduced from the Continent, perhaps by Roman monks; may not the frogs have been introduced to eat with them by the same Italians?"

The second edition of Bell's 'British Reptiles' (1849) adds nothing to our knowledge, except that he published the above-mentioned remarks of his father on the "Whaddon Organs"; and a figure taken from British specimens is given.

The question remained undealt with till 1859, when Prof. A. Newton wrote an article in 'The Zoologist' (p. 6538), relating his discovery in 1853 of the Edible Frog in Norfolk, between Thetford and Scoulton, and published the following important letter from Mr. George Berney:—"I went to Paris in 1837; some letters which I wrote from that place, and which now lie before me, fix the date with certainty: I brought home 200 Edible Frogs and a great quantity of spawn. These were deposited in the ditches in the meadows at Morton, in some ponds at Hockering, and some were placed in the fens at Foulden, near Stoke Ferry. They did not like the meadows, and left them for ponds. I found some in a pond at the top of Honingham Heights, near the old telegraph. I have measured the distance on a map, three chains to an inch, this morning, and find it to be, in a straight line, $1\frac{3}{4}$ mile and 40 yards. . . . . In 1841 I imported another lot from Brussels. In 1842 I brought over from St. Omer 1300 in large hampers. . . . . These were dispersed about in the above-mentioned places, and many hundreds were put into the fens at Foulden and in the neighbourhood."

Prof. Newton adds (*l. c*) that he regards the specimens found by him in 1853, and which were deposited in the Norwich Museum, as the descendants of Mr. Berney's importations.

In the succeeding number of 'The Zoologist' (p. 6565) we find a reply from Bell that the fact of the Esculent Frog being indigenous to this country appears to him to rest on irrefragable testimony. And, in favour of this view, he adduces the opinion of his father, "formed nearly a century ago," regarding the "Whaddon Organs," to which we have already referred.

In the same volume of 'The Zoologist' (p. 6606) John Wolley contributes an interesting article, entitled "Is the Edible Frog a true Native of Britain?" in which, after discussing the information which up to that date had been obtained, he inclines to the opinion that the species has been introduced, considering the reasons given by Bell inadequate to prove that it is indigenous.

The last important note is by Prof. Newton, who relates ('Zoologist,' 1877, p. 61) that, being in company with Lord Walsingham at a small station on the Thetford and Walton Railway, he found a colony of Edible Frogs, one specimen from which was captured and presented to the Norwich Museum. He adds:—"On reference to my former note it will be seen that this species has thus made good its existence in Norfolk for at least thirty-four years, and I cannot doubt that the last colony I found is one of the results of Mr. Berney's original importations, as that gentleman has informed me that he has not introduced any more in the meanwhile, and I know of no one who is likely to have done so. From Lord Walsingham I have since learnt that he has ascertained that the species is pretty generally diffused in a south-westerly direction from the place where we found it, and therefore its naturalisation in the country seems to be accomplished."

Thus it appears that three opinions have been expressed regarding the British *Rana esculenta*:—(1) That it is indigenous. (2) That it was perhaps introduced by Italians. (3) That the Norfolk specimens, and perhaps also the Cambridge ones, were introduced by Mr. Berney from Belgium and the North of France.

The first-named opinion has no evidence to support it: the references of Fleming as well as of Bell's father, even if really applying to this frog (which must always remain doubtful), would

only prove that it has existed in England for the last 150 years; nothing more.

Wolley's opinion that it may have been introduced by Italians as a delicacy (as is said to have been the case with the Edible Snail) was a mere suggestion; still, as we shall see further on, it is one which agrees with the facts I have now to bring to light.

As to the third opinion, I may observe in the first place that, as regards the colony at Foulmire Fen, it is hardly admissible that a few hundred specimens having been turned out in widely separated spots in Norfolk in 1837, and 1840, so many should have migrated to a fen on the southern border of Cambridgeshire to such an extent as to be found there in great abundance in 1843. But there is another much more important argument against this view, which brings me to the object of this communication.

The Edible Frog is a widely distributed form, and like all such forms shows a great amount of variation, so that it is possible to define several local races, or subspecies. One of the safest characters for the division of *R. esculenta* into minor groups is afforded by the relative development of the inner metatarsal tubercle. As I have observed in a previous communication in this Journal (p. 220), the typical *R. esculenta* as commonly occurring in Central Europe has this tubercle compressed, large, measuring 4 to 5 mm. in specimens in which the inner toe, measured from the tubercle, averages 9 to 11 mm. On examining the six specimens from Foulmire Fen in the British Museum, I was much surprised to find that they do not agree with the typical *R. esculenta*, but differ in having the metatarsal tubercle much larger still, shovel-shaped, with almost cutting edge: in the largest specimens the inner toe measures only 7 or 7½ mm., and the tubercle gives 4 or 4½ mm. They therefore cannot be ranked with the true *R. esculenta*, but belong to the Italian form named by Camerano *Rana esculenta lessonæ*. Having received, through the kindness of my friend Dr. Camerano, type-specimens of the latter form from Piedmont, I have convinced myself that there cannot be the slightest doubt that the British Edible Frog belongs to the Italian form. Having informed Prof. Newton of my discovery, he courteously enabled me to examine two specimens from Foulmire, preserved in the Museum of the University of Cambridge, and these also proved to be *R. lessonæ*.

Although convinced that the Cambridgeshire specimens are of Italian, and probably relatively ancient origin, still I had no doubt that the specimens found in Norfolk by Prof. Newton in 1853 and 1877 would prove to be referable to the true *Rana esculenta*, in consequence of the importations by Mr. Berney. Wishing to verify this supposition, I applied to Mr. Gurney, who was kind enough to obtain from the authorities of the Norwich Museum the loan of specimens for my examination. I received two adult specimens, presented by Prof. Newton (the ones alluded to in his communication in 1859), which I was rather disappointed to find had been stuffed, and a young one in spirits, presented by Lord Walsingham (Zool. 1877). My astonishment was great to find that these, also, are of the form *lessonæ*.

It is clear to me, therefore, that all the specimens the capture of which has hitherto been recorded, whether from Cambridgeshire or Norfolk, are not the descendants of those introduced by Mr. Berney, but are of Italian origin. By whom and when they were introduced in this country I cannot venture to suggest.

I append the following measurements, in millimetres, of all the British specimens which I have examined, and of Italian, French, and Belgian specimens.

				From snout to vent.	Inner metatarsal tubele.	Inner toe.
	Rana esculenta, var. *lessonæ*.					
♂.	Foulmire Fen.	F. Bond.	Brit. Mus.	53	4	7
♂.	,,	,,	,,	51	3·5	6
♀.	,,	.	,,	67	4·5	7·5
♀.	,,	,,	,,	60	4	7
juv.	,,	,,	,,	31	2	3·5
juv.	,,	,,	,,	32	2	3·5
♂.	,,	,,	Cambridge Mus.	56	4·5	7
♀.	,,	,,	,,	61	4·5	7·5
♂.	Between Stow Bedon & Rockland.	A. Newton.	Norwich Mus.	65	4	7
♀.	,,	,,	,,	70	4·5	7·5
juv.	Stow Bedon.	Walsingham.	,,	31	2	3·5
♂.	Novara, Piedmont.	Camerano.	Brit. Mus.	48	3·5	6
♀.	,,	,,	,,	72	5	9
	Rana esculenta, typica.					
♂.	Paris.		Brit. Mus.	68	4	9·5
♀.	,,		,,	82	4	10
♀.	Brussels.		Brussels Mus.	82	4	10

If the French and Belgian imported frogs have survived there will be no difficulty in distinguishing them from their relatives, and I hope that we may hear of the capture of specimens for comparison.

NOTES AND QUERIES.

The proposed new Biological Station.—A meeting of the Marine Biological Association of the United Kingdom was held at Burlington House on June 17th, to elect a President and Officers, and frame Bye-Laws. This Society has been founded "for the purpose of establishing and maintaining laboratories on the coast of the United Kingdom, where accurate researches may be carried on leading to the improvement of zoological and botanical science, and to an increase of our knowledge as regards the food, life-conditions, and habits of British food-fishes and mollusks." Subscriptions and donations have at present been received amounting to about £1500; the sum required by the Association for the purpose of building and equipping its first laboratory is estimated at £10,000. At the meeting lately held a code of Bye-Laws was drawn up, and the following noblemen and gentlemen were elected to serve as President, Vice-Presidents, Council, Hon. Treasurer, and Hon. Secretary, namely:—*President*, Prof. Huxley; *Vice-Presidents*, the Duke of Argyll, K.G., the Duke of Sutherland, K.T., the Earl of Dalhousie, K.T., Lord Walsingham, Sir John Lubbock, Bart., M.P., Mr. Edward Birkbeck, M.P., Mr. George Busk, F.R.S., Dr. W. B. Carpenter, F.R.S., Prof. W. H. Flower, F.R.S., Dr. J. Gwyn Jeffreys, F.R.S.; *Council*, Prof. Moseley, F.R.S., Mr. W. S. Caine, M.P., Mr. W. T. Thiselton Dyer, F.R.S., Prof. Jeffrey Bell, F.Z.S., Dr. John Evans, Treasurer R.S., Prof. Herdman, Mr. E. W. H. Holdsworth, Dr. A. Günther, F.R.S., Prof. McIntosh, Prof. Milnes Marshall, Sir Phillip C. Owen, K.C.M.G., C.B., Mr. G. J. Romanes, F.R.S., Mr. P. L. Sclater, F.R.S., Mr. Adam Sedgwick; *Hon. Treasurer*, Mr. Frank Crisp, V.-P. Linn. Soc., 6, Old Jewry, E.C.; *Hon. Secretary*, Prof. E. Ray Lankester, F.R.S., 11, Wellington Mansions, North Bank, N.W., to whom all communications may be addressed.

An Austrian Game Bag.—An official report, published by the Administration of Woods and Forests, states that there were killed last season in Austria proper, as distinguished from Hungary, 6550 Stags, 2244 Hinds, 44,485 Roebuck, 6116 Chamois, 2372 Wild Boar, 1,025,808 Hares, 9103 Woodhens (Black Grouse), 4075 Bartavelles (Red-legged Partridges), 89,209 Pheasants, 789,883 Partridges, 80,032 Quails, 23,683 Woodcock, 17,065 Snipe, 760 Wild Geese, and 43,908 Wild Duck. The return also includes 26 Bears (fifteen killed in Gallicia, six in the Tyrol, three in Bukovina, and two in Carniola), 123 Wolves, 52 Lynxes, 21,462 Foxes, 702 Martens, 15,577 Polecats, 764 Otters, 2447 Badgers, 486 Eagles, and 91,132 Hawks and other birds of prey.

MAMMALIA.

Badger and Polecat in Leicestershire.—A few days ago (June 14th), as a farm servant was going to his work early in the morning, he saw a Badger lying asleep in the bottom of a dry ditch, and having cleverly placed the prongs of a pitchfork, which he was carrying in his hand, across the Badger's neck, he pinned him to the ground; he then tied his legs together with a piece of cord, and carried him home in triumph. The mere capture of a Badger in Leicestershire is by no means an unusual occurrence, for they are very abundant in this neighbourhood. The present case is only worth recording from the peculiar manner in which it was effected. I have seen many which have either been shot or taken alive, some of them very large specimens; one which was shot a few years ago by a person in this village weighed 24 lbs. With reference to the distribution of the Mammalia in England this note may be of some use; and, for the same reason, I may also mention that the Polecat is far from uncommon, though perhaps not so plentiful as the Badger.—A. Matthews (Gumley, Market Harborough).

An amber-coloured Mole.—During the first week of June I received from a mole-catcher in an adjoining parish an amber-coloured variety of the Common Mole. He has met with several of this variety in the course of his trapping.—A. Matthews (Gumley, Market Harborough).

BIRDS.

Note on a Gyr Falcon obtained in Sussex in 1851.—In 'The Zoologist' for 1851 (p. 3233) Mr. Ellman recorded the occurrence, in January of that year, of a Gyr Falcon at Mayfield, in Sussex. This specimen subsequently passed into the fine collection of Mr. Borrer, of Cowfold, where I had recently the pleasure of examining it, and of identifying it as a genuine example of *Hierofalco gyrfalco*, not "immature," as stated by Mr. Ellman, but in fully adult plumage, and in excellent preservation. The very great rarity of British specimens of this falcon induces me to record my opinion that this example is referable to *H. gyrfalco*, and not, as catalogued in Mr. Harting's 'Handbook of British Birds,' to *H. islandicus*. Mr. Borrer informs me that this falcon was shot in the act of devouring a Pigeon on the top of a wheat-stack.—J. H. Gurney (Northrepps, Norwich).

[This same specimen is noticed in Yarrell's 'British Birds' (4th ed., vol i., p. 49) as an Iceland Falcon, doubtless on the authority of Mr. Borrer himself, who furnished the information to the other work quoted.—Ed.]

Falco or Hierofalco.—The Committee of the B. O. U., appointed to draw up the 'Ibis List of British Birds' separate the great northern Falcons from the true Falcons, considering them generically distinct. I have been somewhat puzzled to distinguish characters sufficiently well

defined to justify the separation, and take advantage of the suggestions offered in paragraphs 4 and 5 of Preface to the vol. for 1882, hoping that some correspondent will enlighten me.—Astur.

Stock Dove in Perthshire.—A male Stock Dove, *Columba ænas*, was shot in this neighbourhood (Stanley) on 17th May last, and forwarded to me. This species is very rare in Perthshire, only half-a-dozen other examples having been seen or obtained. Mr. Brooke found a pair breeding in the vicinity of Dunkeld in the summer of 1878. Col. Drummond-Hay saw a pair in the Carse of Gowrie some few years ago, and two examples were obtained in the south-eastern part of the county, as recorded in 'The Ibis' (July, 1878).—Thomas Marshall (Stanley, Perthshire).

Red-throated Pipit in Kent.—Having read Mr. J. H. Gurney's note (p. 192), on the occurrence of the Red-throated Pipit, *Anthus cervinus*, at Brighton, I have pleasure in sending you word of another specimen answering the description, which I obtained here in the month of April, 1880. I shot the bird myself, one fine day, while feeding and singing along the fresh turned-up furrows behind my plough, and not identifying it, sent it to Dover to be preserved for a bright example of the Meadow Pipit.—Walter Prentis (Rainham).

[At our request, Mr. Prentis very kindly forwarded the bird for inspection. Mr. Sharpe has examined it and compared it with specimens in the British Museum, and pronounces it to be undoubtedly an example of *Anthus cervinus*.—Ed.]

Yellow Wagtail in Confinement.—*Apropos* of Capt. Beecher's remarks on this subject (p. 232), I may state that a beautiful cock Yellow Wagtail, *Budytes Raii*, tended with great care by a lady residing near Norwich, and fed on flies, has lived in good health through the winter, in spite of many prophecies that the attempt would be a failure.—J. H. Gurney, jun. (Northrepps, Norwich).

Sabine's Snipe near Waterford.—Through the kindness of Col. Sturt, I have recently had an opportunity of examining a specimen of the so-called Sabine's Snipe, which was shot near Waterford, on Nov. 25th, 1883. This specimen presents a somewhat unusual appearance, and is remarkable for its pale tone of coloration, intermediate between that of the Common Snipe and the examples of Sabine's Snipe usually obtained, which strengthens the opinion now generally held by ornithologists, that the latter form is merely a melanism of the former.—J. E. Harting.

Birds of South Wales.—In reference to Mr. Mathew's paper on the birds of Pembrokeshire (p. 211), the following notes, taken during a short stay I made in Gower, on the Glamorganshire coast, may perhaps be

interesting. The Peregrine Falcon nests in the cliffs; the Chough and Raven were nesting on Worm's Head. Amongst more common birds the Herring and Lesser Black-backed Gulls, Skua, Cormorant, Puffin, Razorbill, Guillemot and Kittiwake were observed; Oystercatchers were extremely numerous. Several species of Plovers, Sandpipers, and other wading birds were noted, besides the Spotted Crake and the Whimbrel; Gannets occasionally seen. Inland have been shot the Long-eared Owl, and some few years ago a Bittern, on Sir H. Vivian's estate. There is a man who lives by the Head, a great bird-lover; but unfortunately he lacks sufficient book-learning to be able to take valuable observations.—T. N. Postlethwaite (Hallthwaite, Millom, Cumberland.)

Abnormal Eggs of Ring Ouzel. – Observing Mr. Buxton's note p. 227) on abnormal eggs of the Blackbird, I may state that I have a clutch of Ring Ouzel's eggs (*Turdus torquatus*), which have an uniform blue colour, with dark spots, closely assimilating to normal eggs of the Song Thrush.—J. A. Harvie-Brown (Dunipace, Larbert, N.B.).

Correction of Error.—Please make the following corrections in my note, "Abnormally coloured Sky Lark" (p. 230):—For *Sky* Lark read *Wood* Lark, *Alauda arborea*, and for "I have seen this plumage before," read "I have *not* seen this plumage before."—E. F. Becher (Southwell, Notts).

FISHES.

Basking Shark on the Cornish Coast.—I have to record the capture of a Basking Shark, *Selachus maximus*. I have seen many at sea whilst on boating excursions, and have passed close to them without alarming them, but these have always been much too large for me to have attempted their capture. This is the first specimen which I have seen on shore; it is a small one, measuring only 9 ft. 4 in. over all, from the tip of the snout to the extreme end of the upper lobe of the caudal fin, measured in a straight line; from the eye to the fork of the caudal fin it measured 6 ft. 9 in. Comparing it with the illustrations given by Yarrell and Couch, it is quite certain that Yarrell's figure misrepresents the fish, and that Couch does not give a sufficiently rapid slope in the rear of the dorsal fin, and does give a very exaggerated figure of the circular punctures around the snout. They are more numerous and much smaller than his illustration shows them to be; and when I first saw the specimen—about twenty-four hours after its capture—there ran through them from the snout, radiating backwards, five thin white lines, which had disappeared before I saw the specimen again, about twenty-four hours afterwards. This specimen was a female. It was captured in a very peculiar way: the S. S. 'Lady of the Isles' was on her voyage from St. Mary's (Islands of Scilly) to Penzance, on June 12th, and when about midchannel she ran down something which proved to be this fish.

It was apparently stunned by the collision. A boat was lowered, and the fish was secured. It turned out to be gorged to repletion with Hake and Mackerel, and it naturally occurs to me that this species of fish may have a habit of gorging itself, which induces its habit of lazily floating on the surface of the sea until its digestive organs have done their work and restored its energies. The descriptions of the fish given by Yarrell and Couch are in the main correct. I may add that the teeth of this specimen were conical and recurved, about half an inch long in the longest, separated from each other, having no serration on their edges, and being in a double row throughout the jaws, except that in the immediate front of the lower jaw they lay in three rows: but as this was a small specimen, and therefore probably immature, I attribute nothing distinctive to this note of the dentition. I could not find that the teeth were (as is usual in the other members of the Shark family) in any degree retractile. This fish is clearly distinguishable from the Basking Shark of Pennant, of which I have a specimen, and which I have already described in these pages.—Thomas Cornish (Penzance).

Greater Forked-beard on the Banffshire Coast.—A very good and entire specimen of this fish, *Phycis furcatus*, was taken at Banff by a trawler during the last week in May. It is said to be a scarce species generally in Britain, and would seem to be remarkably so with us, to judge from the fact that this is only the third specimen, so far as I am aware, which has been captured in the Moray Firth during the last sixty years or thereabouts. The fishermen did not know what it was, and had it not been for the long slender filaments depending from the breast—erroneously called fins—which attracted their attention, it would in all probability have been passed over as a Common Hake.—Thomas Edward (Banff).

MOLLUSCA.

Lutraria oblonga in Jersey.—During a recent visit to Jersey I was favoured with an extra good spring tide, which enabled me to walk over part of the sea-bed three miles from high-water mark. Amongst many rare Mollusca I obtained a number of living specimens of *Lutraria oblonga* and *L. elyptica;* their burrows were revealed by a small key-hole-like hole in the sand banks, from which was ejected, on alarm, a small jet of water. By rapidly probing up the wet sand, the animal was invariably found from six to nine inches below the surface.—Edward Lovett (Addiscombe, Croydon).

CRUSTACEA.

Large Crayfish.—During a recent visit to Jersey I made a journey to Sark, and saw there the finest specimen of *Palinurus quadricornis* I have ever seen. The dimensions were as follows:—Total length, from tip of antennæ to tip of tail, 4 ft. 1 in.; greatest girth, 1 ft. 4 in.; spread of tail,

11½ in. The weight I could not obtain. I was anxious to procure it as a specimen, but it was in the hands of a Frenchman, whose sole idea was to cook it. It was absolutely perfect, and of a rich deep colour.—EDWARD LOVETT (Addiscombe, Croydon).

ARCHÆOLOGY.

Mementoes of Hawking and Hunting in the Last Century.—On the 11th June last, Messrs. Christie, Manson, and Woods sold, at their auction rooms, King Street, St. James's, several pieces of silver plate presented to Col. Thornton, of Falconer's Hall and Thornville Royal, Yorkshire, a noted sportsman, who flourished at the end of the last and beginning of the present century. This plate, the property of Major Thornton Wodehouse, R.A., was sold by auction, at so much per ounce, as follows:—A silver-gilt tea urn, formed as a globe, surmounted by a group of a hawk and dead hare, with this inscription—"Col. Thornton, proposer and manager of the Confederate Hawks, is requested to receive this piece of plate from George, Earl of Orford, together with the united thanks of the members of the Falconer's Club, as a testimony of their esteem and just sense of his assiduity, and of the unparalleled excellence to which in the course of nine years' management he has brought them. When unable to attend them any longer, he made them a present to the Earl of Orford.—Barton Mills, June 23, 1781." Then follow the names of the members of the Falconers' Club; 136 oz. at 15s., £112. A silver-gilt épergne, with oval open-work basket on chased stand, with four fluted dishes, inscribed, "Col. Thornton received this piece of plate of Sir Harry Featherstone and Sir John Ramsden, Baronets, as a compromise to a bet made in honour of a Hambleton fox. Col. Thornton, by his original bet, engaged for 300 gs. P.P. (play or pay) to find a fox at Hunts Whint, or in the Easingwold country, that after Christmas, 1779, should run twenty miles. The day to be fixed and the morning approved by Col. Thornton, and to be determined by Sir J. Ramsden and Sir H. Featherstone or the company up." On the bottom was this certificate:—"We, the undermentioned, do declare that on a day appointed for the decision of the bet made by Col. Thornton with Sir J. Ramsden and Sir H. Featherstone, that a fox broke off in view of the hounds and company, which fox was killed after a continued burst, there not being one check, by the different watches, for two hours and thirty-eight minutes, and we, being the only gentlemen up, do believe that the said fox ran at least twenty-eight miles. Col. T., being a party concerned, gave no vote.—Lascelles Lascelles, Henry Hutchinson, Val. Kitchinman, W. Dawson, Randolph Marriott. N.B.—There were only eight horsemen out of seventy up." 108 oz. at 29s. per ounce, £156 12s. A two-handled cup and cover, won by Mrs. Thornton, inscribed, "Col. Thornton's Louisa, by Pegasus and Nell (dam of Kill Devil), rode by Mrs.

A. Thornton, 9st, beat Mr. Bloomfield's Sister to Allegrante, rode by the noted F. Buckle, 12 st., two miles over York [Race-course], for 1000 gs. This gold [silver-gilt] cup and two hogsheads of Côte Rotie, August, 1804, 96 oz. at 17s. 6d., £81." In addition to these trophies were a two-handled cup and cover, presented to Col. Thornton by the York Regiment, 1795, which fetched £96; and two Louis XVI. soup tureens, part of the same presentation, £900., the prices realised being regarded as very good.

SCIENTIFIC SOCIETIES.

Linnean Society of London.

June 5, 1884.—William Carruthers, Esq., F.R.S., Vice-President, in the chair.

Messrs. J. Starkie Gardner, F.G.S., and John H. Leech were duly elected Fellows of the Society.

Prof. J. Martin Duncan read a paper on a new genus of recent Fungida, allied to the fossil form *Micrabacia*, the genus being based on a specimen of coral obtained from shallow water in the Korean Sea.

A communication was made by Mr. Arthur R. Hunt, "On the influence of Wave Currents on the Fauna inhabiting Shallow Seas." The author refers to various physical data, among others quoting Prof. Stokes and Mr. J. Stevenson; the latter stating that a current of 0·6819 of a mile per hour will carry forwards fine gravel, and that 1·3638 roll along pebbles an inch in diameter. From this and other facts Mr. Hunt argues that wave-currents do materially influence the marine fauna inhabiting shallow water, not only those of the tidal strand but likewise those inhabiting the deeper sea-bottom. He adduces instances of animals living among or on rocks, and of those frequenting sand or other deposit, enumerating species of Starfish, Mollusks, Shrimps, Crabs, and Fish. He says that even the Flat-fishes (*Pleuronectidæ*) seem to have changed their original forms and habits for the purpose of being able to live in shallow waters agitated by waves. Referring more particularly to species of *Cardium*, he endeavours to show how under the influence of wave-currents the variation of species may be promoted, and even their local extinction brought about.

A paper was read "On the Longicorn Beetles of Japan," by Mr. H. W. Bates. In a former paper (in 1873) on the same subject the author treated of 107 species, but now adds many new genera and 129 more species, or a total of 236 specific forms as at present known to belong to the Japanese fauna. This great accession is due to the later collections of Mr. George Lewis, who made a second visit to the islands in 1880-81. Mr. Bates,

reasoning from his fresh material, is inclined to modify his previously stated views as to the predominance of a supposed tropical element in the Longicorn group in question, the relative number of absolutely new genera now turning the scale in favour of Palæarctic or Nearctic affinities.

The last zoological communication taken was "On three new species of *Metacrinus*," by P. Herbert Carpenter, with a note on a new *Myzostoma* by Prof. von Graff. Mr. Carpenter describes *Metacrinus rotundus* from Japan, dredged there by Dr. Doderlein, of Strasburg, and *M. superbus* and *M. Stewarti*, two remarkable forms obtained by the Telegraph Company on picking up a cable near Singapore. The *Myzostoma cirripedium* was formed on the Japan Crinoid.—J. Murie.

Zoological Society of London.

June 3, 1884.—Prof. A. Newton, F.R.S., Vice-President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of May, and called special attention to a Tree Porcupine, purchased May 1st, probably referable to *Sphingurus spinosus*, which was new to the Society's collection; to four Soft-billed Ducks, *Hymenolæmus malacorhynchus*, received May 17th from the Acclimatization Society of Canterbury, New Zealand; and to two pairs of Francolins of different species, obtained by Mr. E Lort Phillips on the Somali coast, and presented by him May 23rd.

A letter was read from Mr. Albert A. C. Le Souef, of the Zoological Gardens, Melbourne, giving an account of the unusual occurrence of two young ones being produced from one egg laid by a Black-necked Swan. The writer described the appearance of these cygnets, which were much smaller than a companion bird of the same age.

Mr. F. E. Beddard read a paper upon the visceral anatomy of *Hapalemur griseus*, and called attention to the various points of difference between this species and *Hapalemur simus*.

Mr. A. D. Bartlett read a paper on some singular hybrids of Bovine animals bred in the Society's Gardens.

Mr. G. E. Dobson read a paper on the unimportance of the presence or absence of the hallux as a generic character in Mammalia, as evidenced by the gradual disappearance of this digit within the limits of a single genus (*Talpa*).

A communication was read from Mr. H. W. Bates, containing a list of the Coleoptera of the families *Carabidæ* and *Scarabæidæ* collected by the late Mr. W. A. Forbes on the Lower Niger. Of these three appeared to be previously undescribed.

Dr. Carl Lumholtz read a paper containing notes upon some mammals which he had recently discovered in Queensland.—P. L. Sclater, *Secretary*.

NOTICES OF NEW BOOKS.

The Birds of South Africa. By E. L. Layard, F.Z.S., &c. A New Edition, thoroughly revised and augmented, by R. B. Sharpe, F.L.S., F.Z.S. Royal 8vo, Part VI. London: Quarritch. 1884.

With the issue of his sixth and last part, Mr. Sharpe has at length completed this important work, the former parts of which have already been noticed (Zool. 1877, p. 350).

So "thoroughly" has Mr. Layard's book been "revised and augmented," that in lieu of the post-octavo volume of 382 pages, which appeared (without illustrations) in 1867, we have now a handsome royal octavo of 855 pages, embellished with twelve coloured plates of some of the rarer or more remarkable species.

This notable expansion of the original work is due, partly to the fact that during the past fifteen years considerable collections have been formed in South Africa, and many important papers published on the ornithology of this subregion, and partly to Mr. Sharpe's enlargement of the area, beyond the geographical limits originally assigned by Mr. Layard, to the Zambesi on the east coast, and to the Quanza on the west coast, which has of course resulted in a large increase in the number of birds to be described.

The geographical distribution of South African birds appears to have been made a feature of the present edition; and in some instances, as with the Woodpeckers, Grass Warblers, Wheatears, and Larks, Mr. Sharpe has given a complete revision of the families and supplied new descriptions. In most cases, however, as he tells us in his Preface, he has retained Mr. Layard's original descriptions, "inasmuch as they were compiled by a first-rate field-ornithologist for the benefit of field-ornithologists, and because they proved eminently successful in the first edition."

Mr. Sharpe is certainly to be congratulated upon having now brought to completion a work which at once takes rank as the text-book for the region, or rather subregion, of which it treats.

The total number of species now included as occurring within the limits of South Africa, as defined by Mr. Sharpe, is 812, and the following synopsis will give an idea of the families which are characteristic of this subregion:—

Order Accipitres.

Diurnes — Eagles, Hawks, &c. 66
Nocturnes—Owls 14

Order Picariæ.

Caprimulgidæ - Goatsuckers ... 10
Cypselidæ--Swifts 12
Coraciidæ—Rollers 5
Trogonidæ—Trogons 1
Alcedinidæ—Kingfishers ... 13
Bucerotidæ—Hornbills 8
Upupidæ—Hoopoes 4
Musophagidæ — Plantain-eaters 5
Coliidæ—Colies 4
Cuculidæ—Cuckoos 16
Indicatoridæ—Honey Guides ... 5
Capitonidæ—Barbets 19
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A List of the Diurnal Birds of Prey, with references and annotations; also a Record of Specimens preserved in the Norfolk and Norwich Museum. By JOHN HENRY GURNEY. 8vo. London: Van Voorst. 1884.

Mr. J. H. GURNEY has just published a list of the Diurnal Birds of Prey, which will form a most useful work of reference for the student of this group, on which Mr. Gurney is so great an authority. For several years past he has been publishing in the pages of 'The Ibis,' an elaborate critique of Mr. Bowdler Sharpe's Accipitrine volume of the British Museum Catalogue of Birds, to which series the present list was intended as an index. Mr. Gurney has, however, given his work a wider scope, to the great benefit of Science; for besides supplying an index to 'The Ibis' papers, he has added useful references to standard works, and has noted the number of examples in the Norwich Museum. Knowing how much the splendid series of Accipitres in this museum is indebted for its formation to the individual energy and liberality of Mr. Gurney himself, who has rendered this collection celebrated throughout the world, one only regrets that an exact list, with localities and dates of the specimens, has not been given, for it is well known that the utmost care has been bestowed on their selection. Possibly, with the groundwork supplied by the present list, Mr. Gurney may feel enabled to complete his 'Catalogue of Raptores in the Norwich Museum,' an undertaking which we can assure him will be well appreciated by ornithologists.

We cannot attempt to follow Mr. Gurney in his classification of the Accipitres, nor are we able to recognize all the genera which he admits, since many of them appear to be founded on peculiarities of coloration and not of structure. These are matters of opinion, however, and do not affect the value of Mr. Gurney's work. In a series of Appendices will be found some short essays on certain vexed questions, and every one who studies this volume as it deserves to be studied will find it a most useful handbook to the Accipitres, containing the latest information on the order in a desirably small compass.